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Universal Mobile Telecommunications System (UMTS);
LTE;
Architecture enhancements to facilitate communications with
packet data networks and applications
(3GPP TS 23.682 version 15.7.0 Release 15)**



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1 Scope

The present document specifies architecture enhancements to facilitate communications with packet data networks and applications (e.g. Machine Type Communication (MTC) applications on the (external) network/MTC servers) according to the use cases and service requirements defined in TS 22.368 [2], TS 22.101 [3], and related 3GPP requirements specifications. Both roaming and non-roaming scenarios are covered.

The present document also specifies transmission of non-IP data via SCEF for the CIoT EPS Optimization.

The present document also specifies the interface between the SCEF and the SCS/AS.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

- [1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
- [2] 3GPP TS 22.368: "Service Requirements for Machine-Type Communications (MTC)".
- [3] 3GPP TS 22.101: "Service Aspects; Service Principles".
- [4] 3GPP TS 23.003: "Numbering, addressing and identification".
- [5] 3GPP TS 23.002: "Network architecture".
- [6] 3GPP TS 23.060: "General Packet Radio Service (GPRS); Service description; Stage 2".
- [7] 3GPP TS 23.401: "General Packet Radio Service (GPRS) enhancements for Evolved Universal Terrestrial Radio Access Network (E-UTRAN) access".
- [8] 3GPP TS 29.061: "Interworking between the Public Land Mobile Network (PLMN) supporting Packet Based services and Packet Data Networks (PDN)".
- [9] 3GPP TS 29.303: "Domain Name System Procedures; Stage 3".
- [10] 3GPP TS 23.228: "IP Multimedia Subsystem (IMS); Stage 2".
- [11] 3GPP TS 23.272: "Circuit Switched (CS) fallback in Evolved Packet System (EPS); Stage 2".
- [12] 3GPP TS 23.040: "Technical realization of the Short Message Service (SMS)".
- [13] 3GPP TS 23.204: "Support of Short Message Service (SMS) over generic 3GPP Internet Protocol (IP) access; Stage 2".
- [14] 3GPP TR 23.039: "Interface Protocols for the Connection of Short Message Service Centers (SMSCs) to Short Message Entities (SMEs)".
- [15] IETF RFC 3588: "Diameter Base Protocol".
- [16] IETF RFC 4960: "Stream Control Transmission Protocol".
- [17] [WAP-168-ServiceLoad-20010731-a](#): "Service Loading".
- [18] [OMA-TS-Push_MO-V1_0-20110809-A](#): "OMA Push Management Object".

- [19] [OMA-TS-Push Message-V2 2-20110809-A](#): "Push Message".
- [20] [OMA-AD-Push-V2 2-20110809-A](#): "Push Architecture".
- [21] 3GPP TS 23.221: "Architectural requirements".
- [22] Void.
- [23] 3GPP TS 23.142: "Value-added Services for SMS (VAS4SMS); Interface and signalling flow".
- [24] 3GPP TS 29.368: "Tsp interface protocol between the MTC Interworking Function (MTC-IWF) and Service Capability Server (SCS)".
- [25] 3GPP TS 33.187: "Security aspects of Machine-Type and other mobile data applications Communications enhancements".
- [26] 3GPP TS 23.402: "Architecture enhancements for non-3GPP accesses".
- [27] 3GPP TS 23.203: "Architecture enhancements for non-3GPP accesses".
- [28] 3GPP TS 32.240: "Charging architecture and principles".
- [29] 3GPP TS 23.246: "Multimedia Broadcast/Multicast Service (MBMS); Architecture and functional description".
- [30] 3GPP TS 23.468: "Group Communication System Enablers for LTE (GCSE_LTE); Stage 2".
- [31] 3GPP TS 29.272: "Mobility Management Entity (MME) and Serving GPRS Support Node (SGSN) related interfaces based on Diameter protocol".
- [32] OMA API Inventory: "<http://technical.openmobilealliance.org/API/APIInventory.aspx>".
- [33] 3GPP TS 23.271: "Functional stage 2 description of Location Services (LCS)".
- [34] 3GPP TS 25.304: "User Equipment (UE) procedures in idle mode and procedures for cell reselection in connected mode".
- [35] 3GPP TS 36.304: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) procedures in idle mode".
- [36] 3GPP TS 23.012: "Location management procedures".
- [37] 3GPP TS 29.128: "Mobility Management Entity (MME) and Serving GPRS Support Node (SGSN) interfaces for interworking with packet data networks and applications".
- [38] 3GPP TS 26.346: "MBMS: Protocols and Codecs".
- [39] 3GPP TS 32.278: "Monitoring event charging".
- [40] 3GPP TS 32.253: "Control Plane (CP) data transfer domain charging".
- [41] 3GPP TS 36.306: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio access capabilities".
- [42] 3GPP TS 26.347: "Multimedia Broadcast/Multicast Service (MBMS); Application Programming Interface and URL".
- [43] 3GPP TS 23.222: "Functional architecture and information flows to support Common API Framework for 3GPP Northbound APIs".
- [44] 3GPP TS 29.122: "T8 reference point for northbound Application Programming Interfaces (APIs)".
- [45] 3GPP TS 29.336: "Home Subscriber Server (HSS) diameter interfaces for interworking with packet data networks and applications".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [1] apply.

For the purposes of the present document, the following terms and definitions given in TS 23.401 [7] apply:

WB-E-UTRAN

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1].

AS	Application Server
CDR	Charging Data Record
CDF	Charging Data Function
CGF	Charging Gateway Function
CIoT	Cellular Internet of Things
CP	Communication Pattern
DDN	Downlink Data Notification
IWK-SCEF	Interworking SCEF
MTC	Machine Type Communications
MTC-IWF	Machine Type Communications-InterWorking Function
NIDD	Non-IP Data Delivery
PCRF	Policy and Charging Rules Function
P-GW	PDN Gateway
PFDF	Packet Flow Description Function
PSM	Power Saving Mode
SCEF	Service Capability Exposure Function
SCS	Services Capability Server
SLF	Subscriber Location Function
SME	Short Message Entities
SMS-SC	Short Message Service-Service Centre
SRI	Send Routing Information
WB-E-UTRAN	Wide Band E-UTRAN

4 Architecture Model and Concepts

4.1 General Concept

The end-to-end communications, between the MTC Application in the UE and the MTC Application in the external network, uses services provided by the 3GPP system, and optionally services provided by a Services Capability Server (SCS).

The MTC Application in the external network is typically hosted by an Application Server (AS) and may make use of an SCS for additional value added services. The 3GPP system provides transport, subscriber management and other communication services including various architectural enhancements motivated by, but not restricted to, MTC (e.g. control plane device triggering).

Different models are foreseen for machine type of traffic in what relates to the communication between the AS and the 3GPP system (refer to Annex A) and based on the provider of the SCS. The different architectural models that are supported by the Architectural Reference Model in clause 4.2 include the following:

- Direct Model - The AS connects directly to the operator network in order to perform direct user plane communications with the UE without the use of any external SCS. The Application in the external network may make use of services offered by the 3GPP system;
- Indirect Model - The AS connects indirectly to the operator network through the services of a SCS in order to utilize additional value added services for MTC (e.g. control plane device triggering). The SCS is either:
 - MTC Service Provider controlled: The SCS is an entity that may include value added services for MTC, performing user plane and/or control plane communication with the UE. Tsp is regarded as an inter-domain interface for control plane communication; or
 - 3GPP network operator controlled: The SCS is a mobile operator entity that may include value added services for MTC and performs user plane and/or control plane communication with the UE, making Tsp a control plane interface internal to the PLMN;
- Hybrid Model: The AS uses the direct model and indirect models simultaneously in order to connect directly to the operator's network to perform direct user plane communications with the UE while also using a SCS. From the 3GPP network perspective, the direct user plane communication from the AS and any value added control plane related communications from the SCS are independent and have no correlation to each other even though they may be servicing the same MTC Application hosted by the AS.

When using the hybrid model, the MTC Service provider controlled SCS, and the 3GPP operator controlled SCS may offer different capabilities to the MTC Applications.

Since the different models are not mutually exclusive, but just complementary, it is possible for a 3GPP operator to combine them for different applications. This may include a combination of both MTC Service Provider and 3GPP network operator controlled SCSs communicating with the same PLMN.

4.2 Architectural Reference Model

Figures 4.2-1a and 4.2-1b show the architecture for a UE used for MTC connecting to the 3GPP network (UTRAN, E-UTRAN, GERAN, etc.) via the Um/Uu/LTE-Uu interfaces. They also show the 3GPP network service capability exposure to SCS and AS. The architecture covers the various architectural models described in clause 4.1.

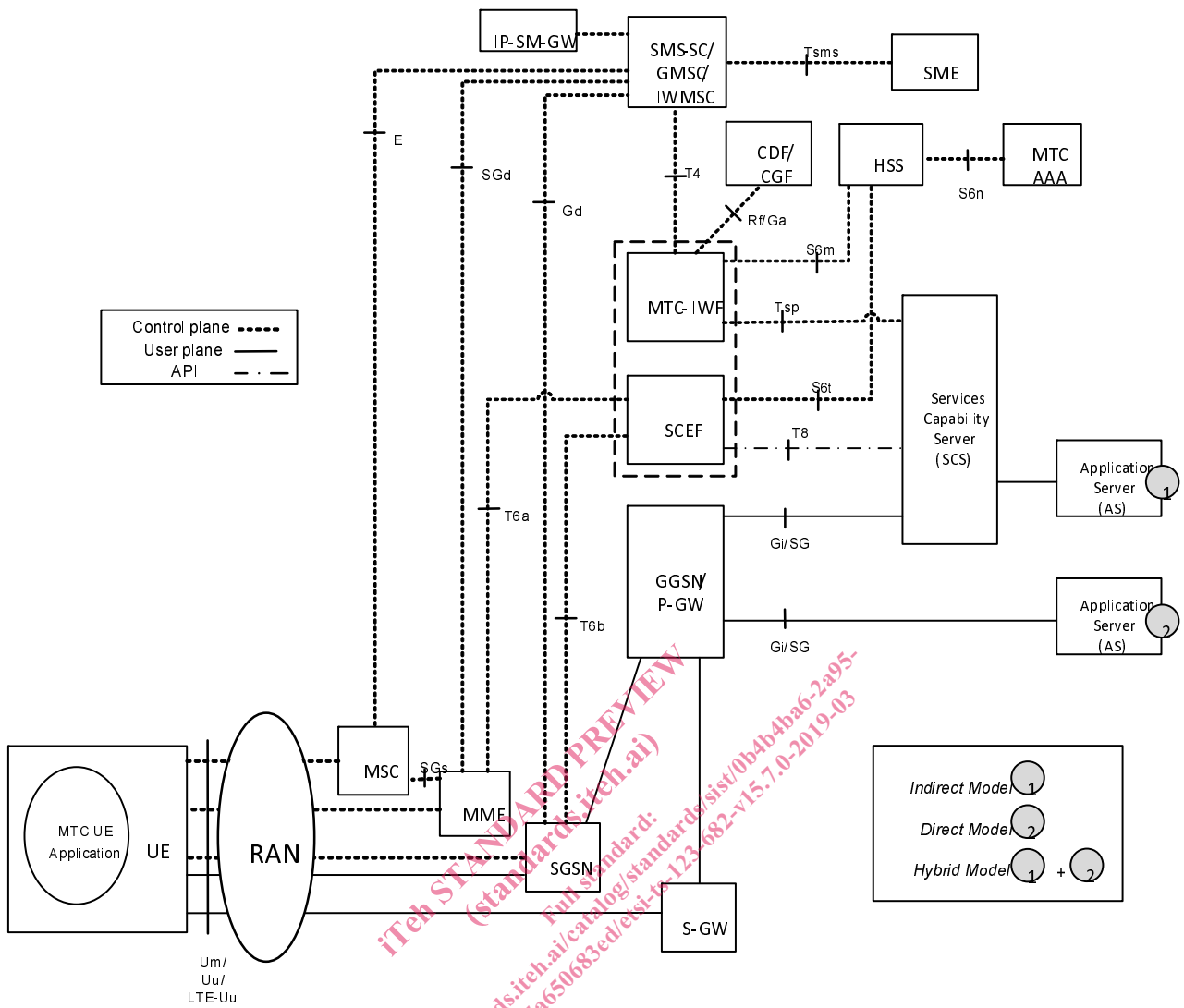


Figure 4.2-1a: 3GPP Architecture for Machine-Type Communication (non-roaming)